July 3, 1956 G. H. CALVERLEY 2,752,726

SECTIONAL TOY FIGURES

Original Filed Jan. 9, 1950 2 Sheets-Sheet 1

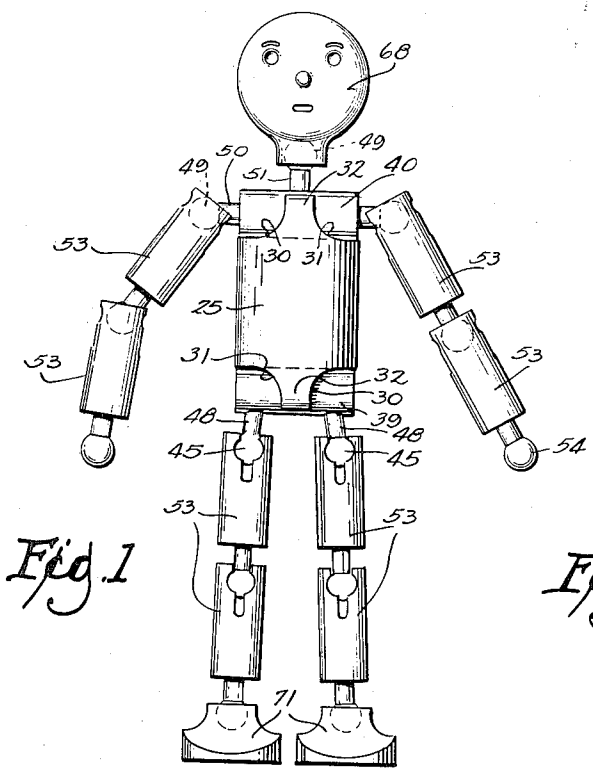

Fig. 1

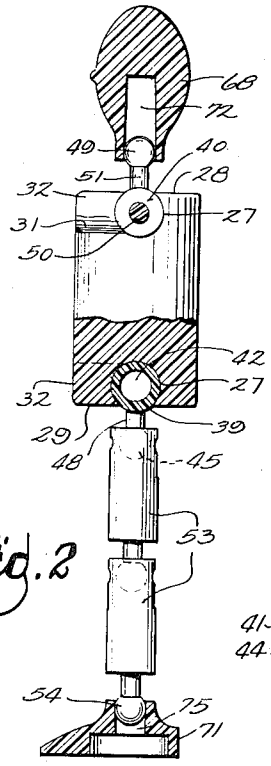

Fig. 2

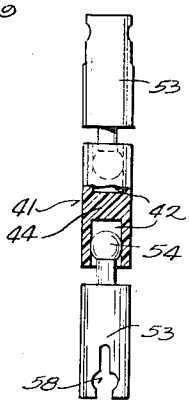

Fig. 6

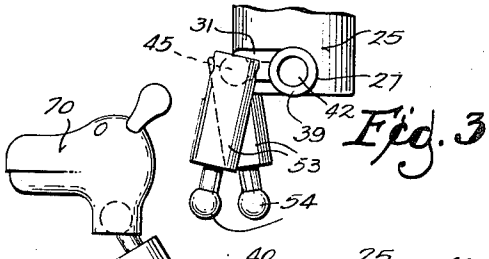

Fig. 3

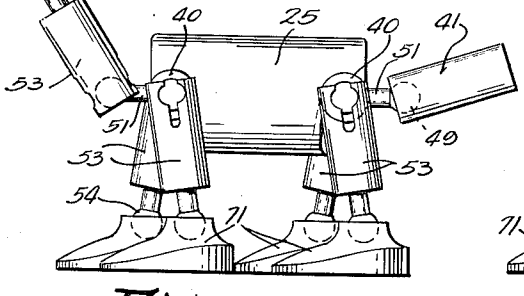

Fig. 4

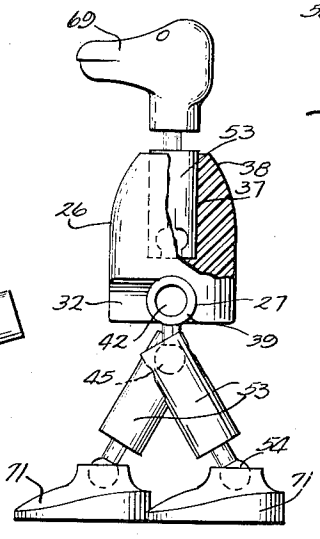

Fig. 5

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SECTIONAL TOY FIGURES

Original Filed Jan. 9, 1950 2 Sheets-Sheet 2

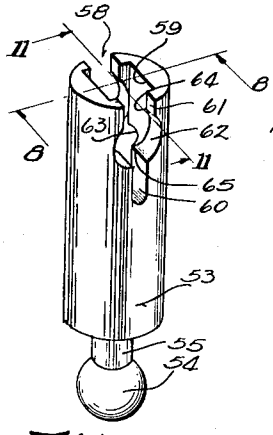

Fig. 7

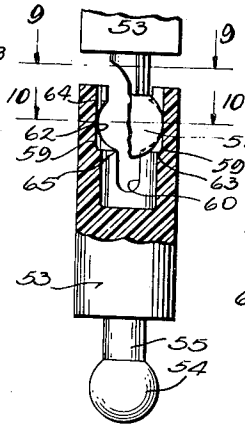

Fig. 8

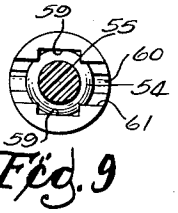

Fig. 9

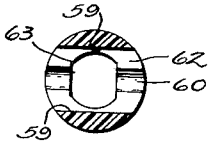

Fig. 10

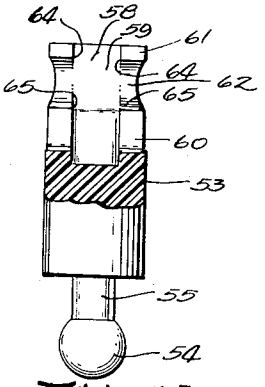

Fig. 11

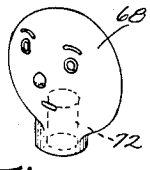

Fig. 12

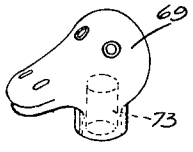

Fig. 13

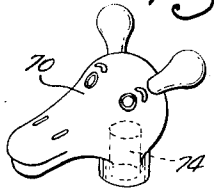

Fig. 14

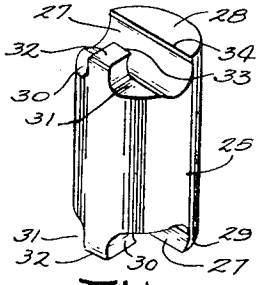

Fig. 15

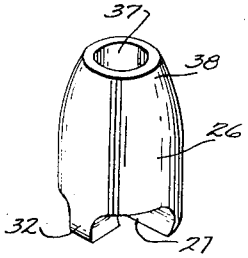

Fig. 16

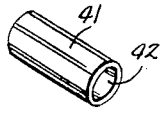

Fig. 17

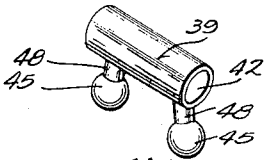

Fig. 18

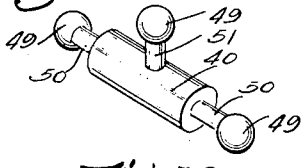

Fig. 19

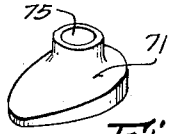

Fig. 20

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SECTIONAL TOY FIGURES

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Original application January 9, 1950, Serial No. 139,339, now Patent No. 2,662,335, dated December 15, 1953. Divided and this application April 20, 1953, Serial No. 349,827

6 Claims. (Cl. 46—22)

This invention relates to improvements in sectional toy figures having interengageable construction pieces.

It is an object of the invention to improve upon the type of toy described by Main and Smelzer in their United States Patent No. 1,746,839. In this connection it is an object of the invention to provide a set of toy or doll building pieces comprising bodies, heads, limbs, feet, and connecting elements of an improved form which may be interchangeably interconnected to build an increased variety of doll figures representing human beings, animals, birds and the like.

It is a particular object of the invention to provide the set with pieces having improved joints for their detachable and articulate interconnection. The improved joints include balls frictionally positioned for pivotal movement in different planes respecting sockets which offer greater resistance to movement in one plane than to movement in another plane by reason of opposed socket sides which are in resilient substantial point contact with the balls. Each ball rotates quite freely about its axis connecting the points of socket contact but moves less freely when moved in a plane in which the ball surface must slide respecting the socket surface.

A specific object of the invention is to provide a sectional toy figure having an elongated body with a transverse bore or socket at one end of the body and opening at the sides and end of the body. This transverse bore is disposed to receive a cylindrical connective piece having offset ball portions carried on reduced neck portions which project from the body for articulate interconnection with limb pieces when the connective piece is properly seated.

A further specific object of the invention is to provide a sectional toy figure comprising interconnecting pieces, certain of which are provided with projecting balls, with a limb piece having an improved terminal socket with walls of less curvature than the ball to embrace the ball in point contact. In this manner the joint is more freely articulate in a plane transverse to the axis defined by the points than in a plane including the axis.

Another object is to provide the limb socket with shouldering elements which insure a positive positioning of the interconnected ball, requiring spreading of the walls to disconnect the ball from the socket.

Another object of the invention is to increase the versatility of use of the various pieces in order that a large variety of figures may be selectively constructed with a relatively small number of pieces.

Other objects will be more apparent to one skilled in the art upon an examination of the following disclosure.

In the drawings:

Fig. 1 is a front view of one type of figure representing a human being which may be constructed with the various pieces of the set.

Fig. 2 is a side view of the same figure with portions broken away and shown in section to illustrate interconnection details.

Fig. 3 is a fragmentary side view of the same figure showing the connective link between the body and legs swung to a position suitable for the figure to assume a seated position.

Fig. 4 is a side view of another type of figure representing an animal which may be constructed with the various pieces of the set.

Fig. 5 is a side view of still another type of figure representing a bird, with portions broken away and shown in cross section, which may be constructed with the various pieces of the figure building set.

Fig. 6 is a side view partly in axial cross section showing the tubular connector of Fig. 17 used to connect two limb elements.

Fig. 7 is a perspective view of a limb element showing a novel socket.

Fig. 8 is a side view of the limb element partially in axial cross section taken along the line **8—8** of Fig. 7, a fragment of an interconnected ball being illustrated.

Fig. 9 is a cross sectional view taken along the line **9—9** of Fig. 8.

Fig. 10 is a cross sectional view of the limb element taken along the line **10—10** of Fig. 8, the ball being removed.

Fig. 11 is a side view of the limb element partially in axial cross section taken along the lines **11—11** of Fig. 7.

Fig. 12 is a perspective view of a head piece representing a human face.

Fig. 13 is a perspective view of a head piece representing a bird.

Fig. 14 is a perspective view of a head piece representing an animal.

Fig. 15 is a perspective view of one form of body piece.

Fig. 16 is a perspective view of a modified form of body piece.

Fig. 17 is a perspective view of a tubular connective element.

Fig. 18 is a perspective view of a different form of connective element having ball joints offset from the tubular axis of the piece.

Fig. 19 is a perspective view of a still different form of connective element having one ball joint centrally offset and other ball joints aligned at opposite ends of the piece.

Fig. 20 is a perspective view of a foot piece.

The figure building set comprises various quantities of the several separate pieces shown in sheet 2 in the drawings. These pieces may be assembled into a variety of human, animal, bird like and other forms such as are exemplified in sheet 1 of the drawings. The versatility of combination and the interchangeability of the pieces is such that a wide variety of simulated creatures may be assembled from a relatively few pieces comprising the set. More pieces of certain types, such as the limb elements, than of other elements, such as body pieces, will normally be supplied. The invention is not confined to the assembly of creatures having bodies, as the articulate link elements are capable of use apart from the body elements to create novel and interesting arrangements. All pieces are desirably made of resilient material such as plastic resins to facilitate the frictional interconnection of the ball and socket joints to be hereinafter described in more detail.

One of the principal pieces of the toy building set is the elongated body which is desirably supplied in either or both of the forms **25** or **26** shown in Figs. 15 and 16. In either form the body is provided at one end with a transverse socket or bore **27** opening at both sides and along the end of the body. As best shown in Fig. 15

the ends 28 and 29 of the body forming the bore walls at one side of socket 27 are relieved at 30 and 31 so as to leave only a centrally disposed unrelieved portion or ridge 32 at one side of the socket 27. The ridge 32 has an incurved lip 33 to cooperate with a like lip 34 at the other side of the socket bore for the retention of cylindrical connective pieces engaged therewith. References may be had to the dolls shown in sheet 1 of the drawings wherein the manner of connection is clearly illustrated.

Whereas body 25 is provided with transverse bores 27 at both of its ends, body 26 in Fig. 16 is transversely bored only at one end, the opposite end being provided with an end opening socket or bore 37. The exterior of body 26 is tapered toward the outlet of socket 37 near its top, as shown at 38, to create a different shape of body having a different range of uses than body 25. The application of body 26 toward the building of a bird is shown in Fig. 5.

The various connective pieces shown in Figs. 17–19 may be utilized as intermediate elements or links between the bodies and the limbs through articulate ball and socket joints to be hereinafter described more in detail. For example, as shown in Fig. 1, the connective piece 39 may be engaged with socket bore 27 at one end of the body to form a link or base element upon which the legs of the doll may be assembled. The connective piece 40 may be engaged with socket bore 27 at the other end of the body 25 to form a connective link or base upon which the arms and head of the doll may be assembled. As best shown in Fig. 4, connective piece 40 may be used at both ends of the body 25 in the event an animal form of figure is to be assembled. In any of these applications the connective piece is frictionally held in position in its transverse bore or socket by the coacting sides and lips of the body forming the socket wall.

An additional connective piece 41 is illustrated in Fig. 17 and one of its uses is illustrated in Fig. 6. This piece, as well as piece 39, is provided at its ends with aligned internal sockets 42. The sockets are mutually slightly tapered toward the mid-point of the piece and are desirably separated at the mid-point by a central wall 44. The sockets receive ball joints frictionally bound therein, and, as shown in Fig. 6, the connective piece 41 is primarily useful in interconnecting the limb elements 53 to provide extra length and articulation. It differs from other links in that having both ends socketed it cooperates with two pieces having terminal balls.

In addition to the end sockets 42, connective piece 39 is provided with balls 45 which are supported at offset positions upon slightly mutually divergent reduced neck portions 48. As best shown in Fig. 1 these cooperate with the socketed ends of limb pieces 53 to form the legs of the doll figure and may be swung into the relieved spaces 30 and 31 of the body 25 in order that the figure may more realistically assume a seated position, as shown in Fig. 3.

Connective piece 40 is provided with terminal balls 49, disposed in alignment at each end of the piece on reduced neck portions 50. A third ball 49 is offset from the piece and is supported on neck portion 51 which projects laterally from a line connecting the terminal balls. The third ball 49 is normally intended to carry a head piece or a tail as shown in Figs. 1–4.

The various balls 45, 49 of the connective pieces provide articulated joint connection with the socketed ends of the limb pieces 53 of the doll figures shown separately in enlarged scale in Figs. 7–11. Each limb piece 53 is provided at one end with a ball 54 which is supported from the piece upon a reduced neck portion 55. These balls are standard with the balls 45, 49 of the connective pieces 39 and 40. The opposite end of the piece is provided with a socket indicated generally as 58 which cooperates with the balls of the various connective pieces and like limb pieces to provide a detachable and articulate joint therebetween.

The socket 58 is formed with oppositely disposed flat walls 59 spaced apart a distance slightly less than the diameter of the standard size ball to grip the ball periphery at diametrically opposed points thereon. The transverse socket walls are slotted at 61 and 60 and are relieved intermediate the ends of the socket to form semi-circular openings 62, the inner corners of which act as seats for an interconnected ball. The slot 61 communicates from opening 62 to the socket entrance to provide a channel for relatively free articulation of the ball in a plane transverse to the ball axis between its point contact with the walls 59, and receives the neck portion supporting the ball as shown in Fig. 3. The slot 60 is somewhat narrower and extends inwardly to lengthen the resistant spring arms to more firmly embrace the ball.

The body material forming the edges of the slots 60 and 61 may be considered as flanges mutually extended from each wall 59 toward similar flanges on the opposite wall to embrace the ball within a seat defined by the semi-circular aperture 62.

Although the socket is preferably molded initially to the indicated shape it may be alternatively described as comprising a longitudinal bore having flat walls 59 and an intersecting lateral bore 62. The socket walls at either side of the lateral bore 62 are slotted or cut away at 60 and 61. The apices of the intersecting bores and slots, comprising the upper inner corners 64 and lower inner corners 65 provide shoulders defining the interconnected position of the ball. The relative dimension of the ball is such as to require pressure to spring the resilient socket walls to admit or remove the ball. In actual practice the socket dimensions are made such as to permit slight movement of the ball in its socket with the shoulders defining limiting positions of such movement. However, it is evident that within such limits the ball position is positively defined and is restrained from separation from the socket except upon forcing the walls apart to accommodate withdrawal.

In addition to the seats or shoulders formed by the inner corners 65, the flattened side portions 59 of the socket terminate at the level of the top of kerf 60 in an additional arcuate seat or shoulder 63, best shown in Fig. 8, to limit inward reception of the balls. Outward movement of the seated ball is restrained by the corners 64. The seated ball generally accommodates itself within the socket in a position limited by the engagement of the inner edges of the semi-circular apertures 62 and the corners 64 and 65 thereof, with ball surfaces. The ball is resiliently held in position within the socket and it is necessary to forceably spread the walls 59 and corners by pressure on the inserted ball to insert or remove the ball respecting the socket. In this manner complete articulation is possible and the resilient pressure tends to hold the parts in adjusted position but the joint is not subject to inadvertent separation.

Articulation of the joint in a plane parallel to the flat walls 59 is accomplished by swinging the ball on a transverse pivot comprising the axis of the ball terminating in point pressure contact at the flat walls. Relatively little friction at these point contacts is encountered and the movement is relatively free and easy. Articulation transverse to this plane, however, requires the ball surface to slide in line contact engagement with the side walls 59 with relatively greater friction and less easily induced movement. This novel differential in articulation may be achieved with any configuration of ball and socket wall providing for diametrically opposite point contact on one axis. The flat wall arrangement illustrated is preferred. However, any non-complementary peripheral configuration wherein the curvature of the ball is greater than the wall would be satisfactory.

The selected figure may be completed by adding one of the heads 68, 69 or 70 shown separately in Figs. 12, 13 and 14 and the feet 71 shown separately in Fig. 20

The head pieces and feet are provided with internal tapered sockets 72, 73, 74 and 75 for detachable connection with the balls 49 or 54 of the connective pieces 40 and limb pieces 53 as desired.

As best shown in Fig. 5 the bore 37 of the body 26 may receive one of the limb pieces 53, socket first, to support head 69 as illustrated. In this manner a life like armless bird or the like may be assembled.

All of the various set pieces may be made of plastic or like material which admits of mass production by die casting or molding operations. A set of a few of each of the elements will provide sufficient building material to construct a wide variety of different figures in doll and like toy forms. The pieces are easily assembled and by virtue of the novel articulated positive joint connections the figures will hold their assembled form in any selected position until dissassembled.

This application is a division of my copending application Serial No. 139,339, filed January 19, 1950, and entitled "Sectional Toy Figures," now Patent No. 2,662,335.

I claim:

1. In a sectional toy figure comprising detachably interconnected members, at least one of which is provided with a projecting ball, a piece adapted for articulate interconnection with the ball, said piece being provided with a socket having opposed walls of less curvature than the ball at both sides of the socket to embrace the ball in two point contact, said socketed piece being further provided with laterally spaced marginal flanges extending toward one another from said walls, said flanges being relieved to form complementary semicircular openings.

2. In a sectional toy comprising detachably interconnected members, at least one of which is provided with a projecting ball, a limb piece adapted for articulate interconnection with the ball, said piece being provided with a socket comprising a longitudinal bore and an intersecting lateral bore spaced from the open end of the socket, the socket walls being slotted from the lateral bore to the end of the socket, the socket walls paralleling the lateral bore being of less curvature than the ball to embrace the ball in point contact on an axis mutually perpendicular to the longitudinal and lateral socket bores.

3. The socketed piece of claim 2 wherein the intersection of the longitudinal and lateral socket bores is

defined by a plurality of apices providing complementary shoulders restraining separation of the socketed piece from an interconnected ball.

4. In a sectional toy figure, the combination with a member having a neck and a ball thereon, of an elongated member of resiliently flexible material having a socket adapted for articulate interconnection with said ball, the socketed member being provided with a longitudinal bore and a transverse kerf subdividing the member into resiliently displaceable walls at opposite sides of said bore, said member further having a transverse bore wider than the kerf to laterally enlarge the kerf at a point spaced from the end of said member to leave corner projections in the wall of said member at the intersection of said kerf enlargement and said kerf, said projections being spaced apart a distance less than the cross section of the ball whereby to restrain disengagement of a ball disposed within said socket.

5. The device of claim 5 in which said kerf enlargement comprises a way receiving the neck of said ball when the member having the ball is swung laterally with respect to the socketed member.

6. In a sectional toy figure, the combination with a first member having a neck and a ball thereon, of an elongated member of resiliently flexible material having a socket adapted for articulate interconnection with said ball, the socketed member being provided with a longitudinal bore and a transverse opening intersecting said bore, and a kerf extending from said transverse opening to the end of the socketed member and subdividing the member into resiliently displaceable walls at opposite sides of said bore, said kerf being narrower than said transverse opening, whereby said walls are provided with projecting flanges partially closing the socket entrance over said transverse opening whereby to retain a ball seated in the socket.

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